Warren Grant Magnuson Clinical Center

U.S. Department of Health and Human Services

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The Warren Grant Magnuson Clinical Center is a complex organism suspended between frontline advances in medical science and the practicalities of patient care and research support. Our goals reflect the duality. We struggle to meet the sometimes conflicting needs of the National Institutes of Health, but even more important is our obligation to provide service to each individual volunteer-patient.

The institution has a distinguished record. It is recognized worldwide as a model facility for clinical research. Those of us who work here think we can improve on the past and are intent on doing so.

Some of the year's efforts and accomplishments are detailed in this report. Proud of their role, the people of the Clinical Center did the work described.

John L. Decker, M.D.
Director, Clinical Center

Building Services

The staff of the Building Services Office, with an annual budget of $1.5 million, oversees all construction and renovation projects. On new projects, the office checks drawings to ensure compliance with fire safety codes and standards as set forth by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Approximately 1,000 work requests are reviewed each year for funds approval as well as needs verification.

Major new building programs include the Medical Information Systems building, new operating room space, a new area for the Department of Transfusion Medicine, building 10A consolidated animal facility, and a patient support area on the 14th floor. Another major project in FY '88 was the removal, repair, and replacement of the hospital's central liquid oxygen tanks.

Twice a year the Building Services Office coordinates emergency power tests for the hospital with the Division of Engineering Services. The Clinical Center is one of the few hospitals in the country that can switch to emergency power under controlled conditions to test the emergency generators.

The safety officer is responsible for the review, analysis, and follow-up on incident reports to ensure compliance with JCAHO and the National Fire Protection Association regulations. An annual hazard surveillance of hospital areas is conducted, and orientation in hazard surveillance is provided for all new employees.

The safety officer and the safety committee provide an appropriate environment for patients, visitors, and staff. In FY '88 the committee continued to monitor such diverse Clinical Center activities as construction, incident reports and follow-up, waste disposal, training, and electrical and fire safety. The Building Services Office and the safety officer work together to ensure compliance with the corridor utilization policy, part of the maintenance of a safe environment.

Protection and Security

The probability of an employee, patient, or visitor becoming the victim of a crime or sustaining an injury resulting from a criminal attack at the Clinical Center or elsewhere on the NIH campus is extremely low. While criminal offenses increased at NIH in FY '88, the number of reported offenses remains small. The good news for Clinical Center occupants is that crime in the Clinical Center was successfully reduced in FY '88, with the number of reported thefts (the most often reported offense) declining more than 32 percent. This reduction in reported crime is particularly encouraging since better record-keeping and more employee participation in reporting criminal offenses usually increase the number of offenses reported.

In June of '88, a Clinical Center Crime Watch program was implemented with the assistance of the Office of Clinical Center Communications. This program increased employees' security awareness and identified ways to prevent crime in the Clinical Center. Crime prevention specialists gave Crime Watch slide presentations to Clinical Center groups and employees at orientations. The presentation is available on request.

The Crime Watch program, aimed at enlisting the assistance of Clinical Center employees, includes signage, posters, desk-to-desk materials, complimentary pencils and key chains with a crime prevention message, and recognition of employee efforts. This program coupled with increased employee awareness and participation helped reduce the number of crimes in the Clinical Center and meet the crime prevention goal for FY '88.

During the FY '88, the police section of the Security Branch continued its recently instituted escort service for NIH employees, patients, and guests. Employees who work around-the-clock and leave the building at all hours of the night use the program. This program, although time-consuming for police officers, reduces employee vulnerability to crime hazards and provides employees with a feeling of security going to their cars or the Metro stop at odd hours.

The Security Branch continued its multi-faceted proactive approach to thwart crime at the Clinical Center with high-profile patrols by uniformed officers, concentrated criminal investigations, and assignment of undercover police officers during hours when crimes most frequently occur.

Comprehensive security surveys were performed in all clinics in FY '88, resulting in written recommendations for increasing security in each area. Consequently, most of the items vulnerable to theft have been cabled or anchored to ensure protection from theft; locks have been installed or serviced; and employees have been made aware of procedures necessary to prevent crime in their areas. In FY '89, patient areas of the Clinical Center will also be subject to security surveys.

The Cardkey Access System was expanded in the clinics, the Medical Record Department, and the Nuclear Magnetic Resonance facility. The Clinical Center continues at the forefront of efforts to provide identification of employees by requiring them to wear PICs (picture identification cards) while on duty. Wearing the card consisting of a photo, identifiers, and a Cardkey Access strip helps employees identify each other and enables them to gain access through controlled entry points.

Materials Management

The Materials Management Department is responsible for the management and control of supplies, equipment, and related services from acquisition to disposition.

The central hospital supply section provides a steady flow of patient care supplies to points of need, and returns soiled equipment and supplies to a central area where the items are either decontaminated, washed, or sterilized, and reprocessed for future use or disposal.

The complex nature of the medical treatment methods employed at the Clinical Center requires medical supply technicians to be knowledgeable of basic sciences to carry out processes that assure thoroughly cleansed, properly packaged, and completely sterilized items used by physicians, nurses, and other health care professionals.

During FY '88, several of the medical supply technicians completed a comprehensive course in central service practice and received certification as central service technicians by the International Association of Hospital Central Service Management.

Supporting the central hospital supply section are the storage and distribution section, which is responsible for the receipt, distribution, and storekeeping of supplies and equipment; and the purchasing and personal property management section, which purchases hospital items and provides for the accountability of the materials.

Housekeeping and Fabric Care

The Housekeeping and Fabric Care Department (HFCD) strives to provide a safe and sanitary environment for the Clinical Center. That is not an easy task with six miles of hallways and public space, more than 1,000 laboratories, and hundreds of offices and patient rooms.

The department's most important concern, however, is patient care. HFCD employees take great pride in providing the best patient care possible. To some, housekeeping duties may seem mundane but to the HFCD staff it is an art and a highly skilled profession.

In FY '88, the Clinical Center [illegible]ced greater emphasis on Universal Precautions and the HFCD sta[illegible] as trained to follow them. This process requires employees to u[illegible] barrier protection (caps, gowns, masks, and gloves) to minimize t[illegible] risk of direct contact with patients' blood or body fluids.

The housekeeping sections of HFCD collect and remove all general and pathological waste. During FY '88, the staff transported more than 1.4 million boxes of pathological waste to the incinerator and sent more than 4.4 million pounds of general waste to the Montgomery County transfer point. The department operates seven days a week, 24 hours a day.

In addition to the cosmetic aspects, the HFCD staff is responsible for flood control throughout NIH. During FY '88, the staff cleaned up more than 100,000 gallons of flood water from various buildings.

The fabric care section provides clean linens for the hospital and clinics, and laundry service for the Poolesville Animal Farm, Landow, Westwood, and Auburn buildings, and the Gerontology Research Center. During FY '88, the fabric care section cleaned 1.4 million pounds of laundry, pressed more than 39,000 pieces, and processed 64,000 lab coats and other work clothing.

Safety

In FY '88, the most significant change in the Hospital Safety Program was the appointment of a new safety officer who worked actively with the CC safety committee to prepare for the

Joint Commission on Accreditation of Healthcare Organizations (JCAHO) survey. Members of the committee have the responsibility to oversee the activities of the safety program. The members volun-

teered their time to update the safety policies, conduct hospital-wide hazard surveillance, participate in an emergency preparedness drill, and endorse several recommendations to the CC director for enhancing the work environment. Prior to the arrival of JCAHO, more than 1,200 employees attended the fire safety and extinguisher training, 10 departments sponsored safety seminars, all of the patient care units and the diagnostic departments were surveyed for environmental hazards, and numerous hazardous situations were investigated.

The most serious incident was a fire in the atrium of the Visitors Information Center on May 11, 1988. A display smoldered and then broke out in flames that scorched the USPHS flags that hung from the 50-foot ceiling. Heavy black smoke penetrated the hospital within minutes. The fire was extinguished quickly and the clean up began. An important outcome was that the safety committee contributed to the development of more stringent fire protection standards for visual displays at NIH.

One goal for the future is to develop a more active safety education program. This is important because of the complex activities in the hospital. Other initiatives include the revision of the employee injury reporting system to track trends, promotion of safety communications among all building occupants, and implementation of measures to decrease the risk of such common injuries as falls and exposures to hazardous materials.

Management Support Services

The mission of the Office of Management Support Services is to formulate and execute the budget of the hospital and administer the personnel management programs for the staff. The office staff consists of budget analysts and clerks. An analyst is assigned to each department to monitor the department's performance within its current budget allocations, and to work with the department heads when problems are identified. In FY '88 the hospital employed 2,015 FTEs with an operating budget of $144,862,000.

The Personnel Office is staffed by personnel assistants and personnel management specialists. The personnel assistants maintain day-to-day personnel operations such as processing actions for recruitment, promotion, within-grade increase, quality step increase, transfer, conversion, retirement, and separation. Personnel management specialists advise one or more departments in major organizational, administrative, and personnel management matters. Each specialist is responsible for recruitment, staffing, classification, employee relations, employee development, equal employment opportunity, and upward mobility.

Personnel actions processed in FY '88 (including hirings, pay increases, promotions, and other actions) increased by seven percent since FY '87. With an average complement of 2,288 employees, 526 new employees joined the Clinical Center staff and 276 left.

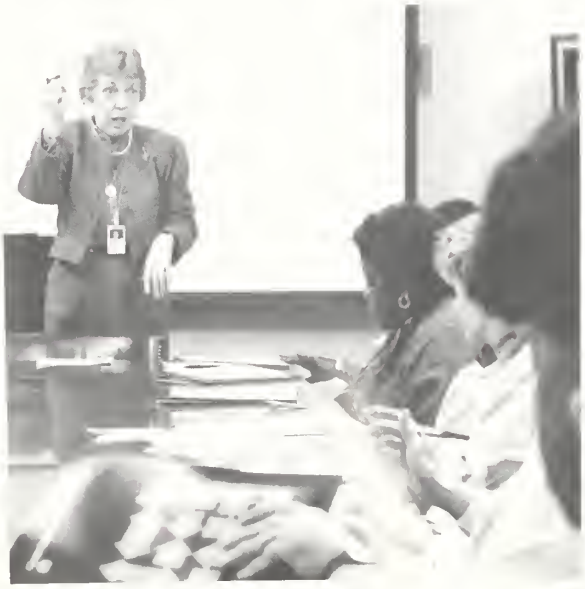
A significant milestone was reached when Congress approved legislation that will allow the Clinical Center to deal more effectively with staffing shortages in the health care fields. Pay, schedule options, benefits, and other authorities previously authorized only for nurses in the Veterans Administration under Title 38 are now available for all NIH nurses and allied health professionals. Far reaching in its impact upon the Clinical Center, Public Law 100-436 will be implemented in several phases. The initial phase, well underway, deals with a more expedient process for obtaining special pay rates and the direct hire of employees without OPM certification. Subsequent phases will address such issues as recruitment and retention bonuses, appointment above-the-minimum step in special cases for all grade levels, the Baylor Plan (weekend alternative), and the development of an NIH promotion system and qualification standards.

Working with both Title 5 and Title 38 authorities, during FY '88 the Clinical Center obtained new special pay rates for three occupations and increased special pay rates for four others. There likely will be three or four new special rates requested during FY '89.

The Clinical Center increased its visibility as an employer in the allied health care market through its attendance at several major job fairs. A Clinical Center brochure designed specifically for the recruitment of allied health specialists is available to departmental staff involved in recruitment efforts.

In FY '88, the Educational Services Office (ESO) oriented 684 new employees. The orientation program is monitored regularly and updated as needed. The presentations on personnel issues and the Clinical Center *Employee Handbook* are being revised.

ESO also presented an all-day workshop, two half-day workshops, and a series of six lectures on death and dying. This program's expanded effort was targeted at Clinical Center caregivers who must cope with terminally ill patients. Videotapes of the lectures are available for other hospitals and health care providers.



A monthly seminar series for s ervisors is coordinated by ESO offering supervisors the flexibili to attend those courses most relevant to their jobs. A "How-To series includes such courses as "How To Manage Your Meetings, "How To Complete the SF-171," "How To Make Effective Presentat ns," "How To Manage Stress," and "How To Communicate More ffectively."

The special summer aides program is coordinated by ESO and gives students the opportunity of a structured work-study program. In FY '88, in addition to planning the training component of the program, ESO took on the role of recruiting, interviewing, selecting, and hiring the students.

In addition to the education activities, ESO processed 2,727 training forms (HHS-350) during FY '88. This represents an increase of 10.3 percent from the previous year.

Equal Employment Opportunity

The Equal Employment Opportunity Office provides staff support and advice to Clinical Center management on all matters pertaining to equal opportunity and affirmative action. The office also provides information and assistance to employees who feel that they have been discriminated against based on race, color, religion, age, sex, national origin, or handicap.

In addition, the office conducts a number of outreach activities designed to ensure diversity in the applicant pool for Clinical Center employment vacancies. The activities include participation in college career days and interaction with local and national organizations that are potential referral sources for members of underrepresented groups.

Clinical Center Communications

The Office of Clinical Center Communications (CCC) expanded its focus and responsibilities in FY '88. CCC staff produced new publications and hospital-wide campaigns, and organized conferences, events, and art shows. The continued use of desk-top publishing enabled CCC to create newsletters, booklets, flyers, news releases, and other publications.

Employees enjoyed the updated and redesigned Clinical Center newsletter, *CC News*. New columns and regular feature stories were published and the cover was modified to include graphic illustrations by a well-known medical illustrator.

FY '88 was a very productive time for patient education efforts. Numerous publications were produced for Clinical Center departments that covered a range of subjects including specific therapies

and procedures as well as guidelines for the use of such Clinical Center services as patient activities. To meet the educational needs of non-English-speaking patients, some publications were translated into Spanish and Greek.

CCC staff assisted the Confidentiality Education Group in developing its awareness campaign. Creatively designed posters will continue throughout 1989 to help maintain staff awareness of the need for greater confidentiality.

In coordination with the Security Branch of NIH, CCC staff created the Crime Watch campaign for the Clinical Center. The campaign enlists the help of employees in preventing crime and uses such themes as "Take time to lock up," and "Insecure? Call security." The two-year campaign includes posters, flyers, and give-aways. During the first months of the campaign, crime dropped by 32 percent.

The CCC lecture series, "Medicine for the Layman," was successful again this year. Excellent speakers discussed such interesting topics as chronic fatigue syndrome, multiple sclerosis, and sexually transmitted diseases to standing-room-only audiences in Masur Auditorium. The series, promoted on television and radio stations, and in newspapers and community calendars, received more media coverage this year as a result of CCC's active distribution of videotaped interviews for television and newly designed printed information about the lectures.

The CCC introduced a new design for the Medicine for the Layman promotional materials that retains the familiar MFL logo, but creates a more modern look and costs less to produce than its predecessors.

Based on this annual series, original and informative booklets and videotapes are created and widely distributed throughout the country. *Relieving Pain*, the first booklet in the new design, was produced in FY '88 and copy requests have reached 1,000 per month. Four other Medicine for the Layman booklets in the new design will be released in FY '89.

Clinical Center galleries featuring local artists have grown to six since the first opening three years ago. Gallery sales netted $10,000 for the Patient Emergency Fund and continue to improve the hospital environment for staff, patients, and visitors. Shows in the Lipsett Gallery are sponsored in conjunction with the National Academy of Sciences, Fairfield University, and the Stetten Medical Museum. All CC galleries are booked for the next two years and exciting new shows are planned.

The special events section of CCC was busy this year. This section manages programs for medical and scientific visitors to the Clinical Center and plans, coordinates, and directs such special programs as the NIH Lecture Series.

Bioethics

The Bioethics Program provides a variety of services to help safeguard the highest ethical standards in clinical research and patient care.

The Bioethics Program staff assists the director of the Clinical Center in review of research projects to assure that experimentation with human subjects proceeds in an ethical manner. In the past, research protocols had been reviewed by the bioethics staff after Institute Clinical Research Subpanel (ICRS) review. A pilot program will provide each ICRS with a bioethics consultant to facilitate simultaneous discussion of both the ethical and the scientific aspects of the study. Another service provided by the Bioethics Program is the opportunity for principal investigators to review their consent documents with a member of the bioethics staff to address and resolve ethical issues before ICRS review. In FY '88, the Bioethics Program cooperated with the Office for Protection of Research Risks in an ongoing pilot study of ICRS procedures on campus. This was part of a feasibility study for a nationwide evaluation of ICRS procedures.

A clinical consultation service helps resolve ethical issues that arise in the patient care and research settings. A consultation can be requested by physicians, nurses, other health care providers, pa-

tients, and families. The process of clinical consultation is being evaluated so that its effectiveness can be maximized. Increased feedback from consultees will be sought and follow-up will be routine. Plans include expansion of the consultation service to increase the number of individuals skilled in ethical consultation and to increase the effectiveness of the service by utilizing individuals from a multiplicity of disciplines.

Educational programs and seminars on bioethical issues are provided by the bioethics staff. Program staff help develop patient information brochures on such ethical issues as "Do Not Resuscitate" orders. Also, in the area of education, the Bioethics Program will offer a one-year fellowship in bioethics. The fellowship is open to MDs and PhDs and includes a didactic component, experiences in clinical bioethics consultation, research protocol review, participation in policy evaluation and formulation, multidisciplinary teaching in the area of bioethics, and participation in the research efforts of the Bioethics Program.

In FY '88 a new chief was appointed to the Bioethics Program as it embarks on several of its own research projects. A major task of the staff is the methodical study of bioethical issues in clinical medicine and research in collaboration with practicing clinicians and researchers.

Special Programs

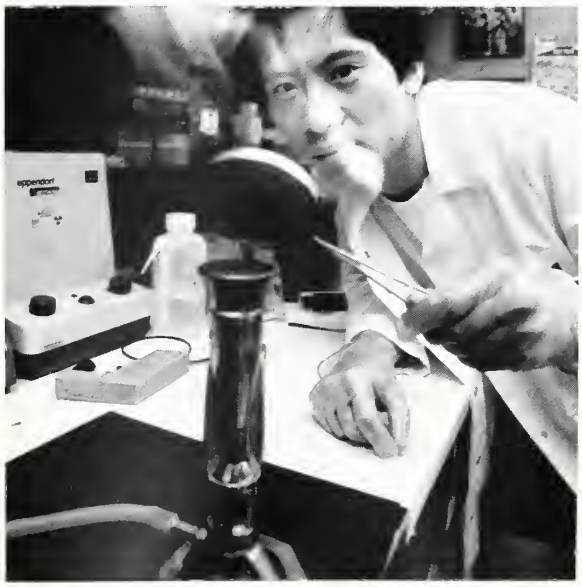
The Clinical Electives Program offers courses in 16 clinical subspecialties for third and fourth year medical and dental students. During FY '88, 212 students from U.S. medical and dental schools participated in the program. Transportation reimbursement was reinstituted to encourage greater participation, particularly by students from the Rocky Mountain area and western states.

The Summer Research Fellowship Program provides research experiences for medical and dental students under the guidance of preceptors from the Institutes and the Clinical Center. The Summer Research Fellowship Program is designed to encourage and motivate students to consider careers in biomedical research and teaching. During FY '88, 97 students participated in this program.

The Medical Staff Fellowship Program provides opportunities for physicians and dentists to gain experience in clinical and laboratory investigation. To be eligible for this postdoctoral program, candidates must have completed two to three years of postgraduate

medical training. During FY '88, 146 medical staff fellows entered on duty at the NIH. Of this number, 68 were selected through the NIH matching process and 78 were hired directly by the Institutes.

The Normal Volunteer Program provides opportunities for individuals to participate in clinical research by serving as healthy patients who are involved in selected protocols. Volunteers enable clinicians to learn more about normal physiology and metabolism, which may result in a greater understanding of the causes of disease and the development of new treatments. The student program recruits participants from colleges and universities through cooperative arrangements. Students spend a semester at the Clinical Center participating in a variety of research protocols. Students also are assigned to research laboratories where they gain valuable experience under the guidance of Clinical Center and Institute investigators. During FY '88, 50 students from eight colleges participated in this program. The Community Volunteer Program enables local residents to participate in similar studies. During FY '88, 320 inpatient community volunteers participated.



KEEPING FAMILIES HAPPY

Patient Activities

The Patient Activities Department (PAD) provides therapeutic recreation and library services to patients and their families. In doing so, the staff promotes the importance of recreation in the maintenance of a healthy lifestyle and in the improvement of the health of hospitalized persons. All services are designed to promote involvement, free choice, and enjoyment; are consistent with the patients' assessed needs and limitations; and support Clinical Center research.

The department continues to orient patients to the non-medical aspects of the hospital and to the community. Therapeutic recreators routinely participate in rounds and patient care meetings to identify patient needs. Therapeutic recreators are active in both receiving and giving continuing professional education. The quality assurance committee continues to review patient safety matters and recently began a system of monitoring quality care indicators. Significant progress was made in researching the effectiveness of recreational activities on coping with illness.

The PAD involved patients and their families in more than 1,800 leisure activities each month in FY '88. These contacts included crafts and special events, as well as bedside activities to help individuals fill their non-treatment time pleasurably. The patient library circulated an average of 760 books each month in addition to distributing magazines, audiotapes, and videotapes.

Several new programs and services initiated in FY '88 include pet therapy in the children's playroom and on patient care unit 13 West (pediatric oncology); translation into French and Spanish of the department's "hospital jobs" coloring book; translation into Greek and Spanish of the department's arts and crafts brochure; a teen support group for oncology patients; and intergenerational recreation activities between Alzheimer and pediatric patients in the playroom.

Patient Representative

In FY '88, the patient representative, assisted by trained volunteers, documented more than 1,800 patient contacts. Many of these contacts were for the purpose of orienting new patients to the mission of the hospital, the policies that govern it, the rights of patients, and the availability of an advocate. In addition, these orientation sessions provided the hospital with a means of monitoring patients' introduction to the hospital and resolving misunderstandings. Volunteers on duty in the surgical and intensive care family waiting area afforded relatives the assurance of an immediate means of communication. Volunteers were in a unique position, in this microcosm of the hospital, to keep staff advised of patient perceptions and experiences that may need to be addressed.

The patient representative responded to requests from 254 patients or families and 64 staff members to provide assistance or investigate complaints. Many required extensive follow-up, and all were resolved or had explanations provided with the cooperation of the staff or service best able to address the issue. Periodic written reports to the Office of the Director and liaison with quality assurance, patient education, administrative policy, and bioethics groups and committees, kept patients' concerns highly visible. The patient representative routinely conferred with staff at all levels, participated in orientation of administrative and patient care staff, and assisted with patient orientation publications.

Children's School

Next to the 10th floor solarium is a quilted wall hanging of a traditional schoolhouse. Appropriately, the door leads to the one-room NIH schoolhouse. Three hundred and seventy-five school-age patients from grades kindergarten through 12 were taught there in FY '88. The staff of six teachers from the Montgomery County School System worked to meet the educational needs of inpatients and outpatients.

The NIH Children's School was established in 1953. Its goal is to provide students the opportunity to study and keep up with their classes so that the return to their hometown school is as smooth as possible.

There is an additional classroom on 3 East that has been involved in an NIMH research study of boys with attention deficit hyperactivity disorder. In FY '88, students who were HIV-positive continued to attend classes at the NIH school.

Spiritual Ministry

The Department of Spiritual Ministry is responsible for ensuring that the religious and spiritual needs of patients are met. The department employs a full-time secretary and several chaplains on a full- and part-time basis. The full-time chaplain staff represents the two largest "faith groups"—Protestant and Roman Catholic. A Rabbi and three Roman Catholic clergy comprise the part-time chaplain staff. The department secretary works full-time to serve all the faith groups and to refer inquiries and requests to the appropriate chaplain.

The highest priority for the chaplains is visitation with patients and their families. This accounts for more than 50 percent of the chaplains' regular day. During a visit with a patient, chaplains discuss a variety of topics including the person's religious upbringing and beliefs, and any special needs the patient may have while at the Clinical Center. Another important responsibility is the chaplain's exercise of leadership in worship-related activities. For example, the Roman Catholic chaplains conduct mass each day in the 14th floor Chapel; the Protestant chaplains lead a Sunday worship service; and the Rabbi conducts a Sabbath service on Friday afternoons.

The clinical education pastoral students conduct a mid-week devotional service. Additional special worship services sometimes are held on religious holidays, as memorials for individual patients and staff, or as a special rite. A volunteer group of Islamic staff provides leadership in a Moslem service on Friday afternoons and occasional weekdays.

Other activities of the department include: participating in bioethics consultation; supervising clinical pastoral education; committee work; participating in community programs for health promotion; representing NIH at national meetings of ecclesiastical groups; promoting health awareness and religious issues; participating in staff education programs; and writing articles for publication in religious journals and books.

The Department of Spiritual Ministry represents rich and diverse resources to patients. The chaplains are committed to continuing to provide a quality program to meet the needs of patients, their families, and the community at large.

Social Work

Individual and group counseling services are available to help patients adjust to illness and hospitalization. Social workers help patients and families use community resources. They interpret rules, regulations, forms, and eligibility criteria associated with health, financial, and social support services and ease the process of seeking, identifying, and accepting help from agencies in patients' home communities. With knowledge about the mission and function of public and voluntary agencies, social workers help families find those resources most suited to their needs. They work with patients and families in planning for discharge from the hospital to assure continuity of care.

In addition to discharge planning, social workers provide counseling services for crises, emotional problems, rehabilitation, and concerns related to dying and death. Meeting psychosocial needs expressed by patients and families within these areas, the staff counseled more than 5,000 hospital and clinic patients in FY '88. About 25,000 social work contacts were made with individuals and family members. More than 500 group meetings were held with an attendance of three to 12 patients each session. The meetings provided useful health care information, support for problem solving, and orientation to the hospital and the community. Social workers routinely participated in rounds and meetings with other patient care staff.

Staffed by a full-time director, the volunteer services program is an integral part of the department. It offers a wide range of volunteer opportunities to community people interested in assisting researchers, nurses, physicians, and other patient care specialists in delivering quality health care and emotional support to patients and families. In FY '88, 235 individuals volunteered more than 6,000 hours through programs sponsored by the Retired Senior Volunteer Program, the American Red Cross, the Clinical Center Volunteer Program, and special interest groups.

Volunteers provide many personal services that help patients and families adjust more easily to the hospital environment. In support service areas, volunteers give general information, provide some escort services, deliver mail and flowers to the bedside, answer telephones, assist patients with menu selection, provide refreshments to patients and families in waiting areas, and contribute to a variety of craft activities.

Through the diligent efforts of volunteers, the needs of many patients, families, and visitors are met in a very special way. Volunteers greet and converse with families in surgical and intensive care waiting areas. They also work closely with professional staff in outpatient clinics, rehabilitation services, recreational programs, and on special projects. The distribution of patient education literature, newsletters, research programs, recruitment services, brochures, and informational packets about the hospital are many of the means by which volunteers take an active part in keeping the community informed.

These hard-working people are part of what makes the NIH Clinical Center such a wonderful place to call "home" for the time each patient must spend at the CC. At the same time, the Social Work staff serves as a vital link in biomedical research programs.

Information Systems

The Information Systems Department (ISD) was created in 1983 to consolidate such Clinical Center computer activities as planning, development, operations, and maintenance.

The department currently operates a computer center providing round-the-clock service to patient units, clinical pathology, pharmacy, radiology, admissions, and other departments engaged in administrative, diagnostic, and therapeutic activities.

In addition, ISD provides advice and support to Clinical Center departments that have or are contemplating acquiring micro- or mini-computers, or other computer hardware or software.

ISD manages and operates the Clinical Center Medical Information System (CCMIS) a large "real-time" computerized system that provides access to patient records to retrieve and add data. Medical orders are entered directly by physicians or nursing personnel using video terminals that connect to a central computer. Patient information is displayed on video screens and printed for incorporation into the patient record.

CCMIS is used by 4,000 physicians, nurses, and others at work in the Clinical Center. Each year, ISD trains approximately 250 physicians, 300 nurses, and 550 other staff members to use the system. There are more than 200,000 patient biographical records on file, with complete clinical records retained on the system for all current patients. Each day 13,000 new entries are made to patient records. In FY '88, more than one million records were added to the system and a like number of vital signs entries; more than 10 million pages of patient medical records were printed. The total patient information on disk files, available for instant retrieval, exceeds one billion characters. In addition, patient data on 200,000 former Clinical Center patients is maintained at the Division of Computer Research and Technology for retrospective research studies.

To provide support to the wide range of CCMIS users, ISD maintains 25,000 screen display formats and hundreds of printout formats. Each year, ISD creates 5,000 new or revised screen formats and handles 40,000 telephone calls related to CCMIS support and enhancement.

During FY '88, a variety of enhancements was made to data processing systems at the Clinical Center. Methods were developed to improve the extraction of selected elements of research data from CCMIS and to transfer this information to authorized personal

computers operated by individual researchers. Attention was focused on patient confidentiality; only specifically authorized users have access to the data.

Progress was made in developing multi-function terminals that can emulate and therefore replace a variety of special purpose terminals. Two powerful new computers installed in the ISD computer center use extensive disk storage capacity. This new hardware and some new software packages will enable ISD to provide better service to many departments and enhance patient care and research capabilities. In addition, the installation of a constant power supply has virtually eliminated the problem of brief electrical outages, the most common cause of MIS downtime.

Medical Record

The Medical Record Department maintains and makes available the record of each Clinical Center patient. Some of the individual binders contain only one or two sheets of paper; others are multi-volume tomes equaling the Encyclopedia Britannica in size. The appropriate record must be available for every clinic visit and every hospital admission. They also are used in medical and scientific research and for medicolegal or administrative action. The medical record serves as a dynamic mode of communication describing the care of the patient as well as a continuous accounting of patient management.

Medical Record technicians in the medicolegal section are responsible for processing all requests for release of information from a patient's medical record. Medical information may be disclosed to other health care providers, the Veterans Administration, the Social Security Administration, insurance companies, disability and welfare agencies, patients, or next-of-kin. In every instance the patients' privacy is of the utmost concern, and any information released is limited to that required to fulfill legitimate requests.

In order to assure the effectiveness of the medical record, the department must concern itself with systems for the maintenance, analysis, storage, and retrieval of medical records while preserving the integrity, privacy, and legality of the information they contain.

Medical Record administrators are health professionals responsible for the management of approximately 220,000 medical records of patients treated at the Clinical Center since its opening in 1953. These administrators are responsible for establishing systems, data bases, and indices for treatment, research, health planning, and quality assurance. They determine department policies and procedures, supervise employees, and evaluate employee performance. Medical Record professionals are health information managers.

The scope of this effort can be appreciated by glancing at some figures for FY '88. Staff in the files section pulled more than 90,000 medical records for patient care and 15,000 for research, and they filed more than 500,000 individual medical reports in the records. The medicolegal section processed more than 9,000 requests for disclosure and dispatched more than 150,000 pages of medical information. Staff in the record processing section performed ap-

The medical clerks in each of the eight outpatient clinics provide administrative support, supplies, and medical equipment for the professional staff. The medical clerks greet the patients upon their arrival to the clinics and help them through a whirlpool of confusion.

The contract for the messenger and escort service has been in place for three years and has made a positive contribution to the hospital. The escorts are efficient and effective as they transport patients and specimens.

Ober-United Travel Agency offers convenient and friendly travel services for Clinical Center patients as well as NIH staff.

GOOD FOOD AND GOOD MEDICINE

Nutrition

In addition to providing quality nutritional care and food service to patients, the Nutrition Department supports Institute protocols designed with a nutrition component and conducts research in clinical nutrition and food service management.

A two-week menu cycle offers 96 modifications to meet the needs of patients on a variety of diet prescriptions. The food choices offered on these menus reflect the current dietary guidelines for healthy eating. The Clinical Center Diet Manual, written by Nutrition Department dietitians in FY '88, provides guidelines for various types of therapeutic diet plans used at the Clinical Center.

All meals, snacks, and supplements for patients are prepared in a main kitchen. Staffed with registered dietitians, supervisors, cooks, bakers, and food service workers, the main kitchen operates 14 hours a day, seven days a week. The kitchen serves more than 30,000 meals a month at patients' bedsides. Extended services meet the needs of patients whose meals must be served early or late because of scheduled tests and procedures. The department also provides an average of 110 meals to outpatients each month.

Special kitchens produce meals for metabolic balance studies (a method of investigating the metabolism of chemical elements or food constituents in a patient by determining the loss or retention of these substances in the body) and meals of low bacterial count for those patients who are unable to ward off infection.

The clinical nutrition service includes a staff of registered dietitians who work as members of the medical team, assess patients' needs for various levels of nutrition intervention, and provide care based on the need identified. A patient with cancer, for example, may follow a different diet plan than a patient with heart disease.

In FY '88, the Nutrition Department computerized many of its major functions, thereby significantly expanding its capacity to provide state-of-the-art care and management of services. Modified diets increased from 12 to 96 types. The capacity to compute patients' nutrient and caloric intake became feasible. The system efficiently manages functions associated with menu printing, food procurement, inventory control, forecasting, recipe development, production control, and cost analysis.

Pharmacy

Inpatients at the Clinical Center receive most of their medications by a "unit dose" distribution system. A 24-hour supply of unit dose medicines is placed in a drawer labeled with the patient's name and delivered to the nursing unit. This system helps assure that each patient receives the correct dose of the correct drug at the correct time. Each dose is individually packaged, labeled, and protected from contamination up to the time it is administered. The unit dose distribution system is the safest and most reliable way to give medications to inpatients. Approximately one million unit doses of medicine are dispensed by the inpatient pharmacy each year.

Pharmacists working in the intravenous (IV) admixture unit prepare all of the medications that will be given directly into a vein. This is usually a matter of adding concentrated drugs to sterile salt or water. Once the drug is dissolved, the mixture is ready for intravenous administration. Specially trained pharmacy personnel make these intravenous solutions under rigorous standards of sterility and quality control. The pharmacists ensure that all medications mixed in intravenous solutions do not interact unfavorably. The solutions are made in laminar flow hoods that filter out dust and bacteria in the air so the solutions will not be contaminated with potentially dangerous airborne material. The inpatient pharmacy mixes an average of 750 IV admixtures each day; however, there are some days when the workload is in excess of 1,000.

The outpatient pharmacy fills prescriptions for outpatients and inpatients who are about to be discharged. The pharmacists also counsel patients about their medicines. It is important that medicine is taken properly because the success of the treatment protocol depends on strict adherence to the directions of the prescribing doctor. The outpatient pharmacy keeps extensive patient records so that every dose of investigational drug is accounted for and the integrity of customized drug regimes is maintained. The outpatient pharmacy fills approximately 400 prescriptions each day. Medications are mailed to patients who are in long-term studies and do not require frequent follow-up visits.

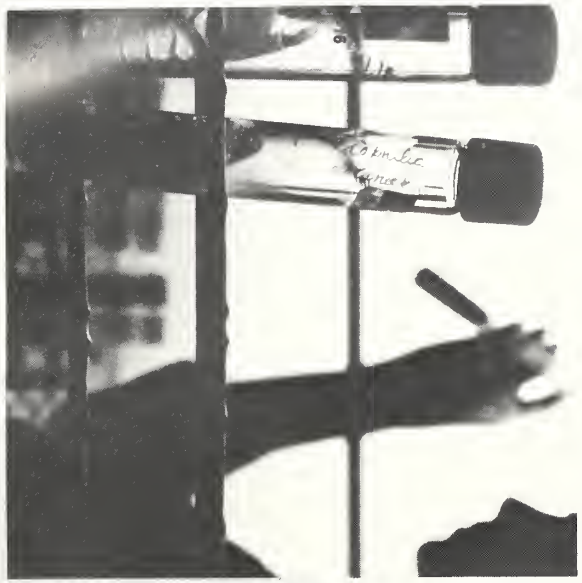
The department registers and controls all investigational drugs used for Clinical Center patients and provides a variety of services to assist investigators in their clinical studies. Tablets, capsules, or injections are prepared as required by the protocol. More than two million investigational drug units are formulated and packaged each year. Pharmaceutical chemists test the potency and stability of the drugs by the Pharmacy Department. Detailed records are kept on the amount of drug dispensed to each patient and when the drug is given.

Clinical pharmacists are assigned to such patient care areas as cardiology, mental health, oncology, intensive care, and internal medicine. These are specialists who consult on drug therapy and participate in the clinical studies.

In FY '88, the Pharmacy Department improved its operations in several areas. A more reliable drug delivery system was established; drugs are hand delivered to the nursing unit on a prescheduled basis. A major collaborative study with Auburn University was concluded that showed pharmacist counseling of outpatients improved compliance to prescribed drug therapy. Computerization was a major initiative. The computerized logging of investigational drugs was instituted in both the outpatient pharmacy and the two satellite pharmacies. This ensures careful tracking of patients on specific drug treatment protocols. The inventory maintenance and issuance of controlled drugs was computerized to improve usage monitoring of such drugs as narcotics and sedatives, and to improve resupply to the nursing units.

Involvement in AIDS activities continued during the year. Approximately 16 percent of the total personnel resource (12 FTEs) was devoted to supporting AIDS research and treatment. The department worked with a local drug chain and with Clinical Center Communications to develop a program to train pharmacists about AIDS. Staff members participated in a videotaped program for television on the subject of AIDS treatment and prevention.

In FY '88, the support of AIDS treatment and research will be expanded. The satellite pharmacy in the 12th floor clinic will double in size to accommodate the expected increase in activity. The 13th floor inpatient satellite pharmacy also will be refurbished to provide a more efficient facility to meet projected increases in work load. Computerization of programs will be expanded. The computerized investigational drug logging system will include inpatients as well as outpatients. The use of bar coding in managing stock and issuing medication within the pharmacy will be implemented. Also, an automated drug interaction surveillance system will be incorporated into the Medical Information System.



Hospital Epidemiology

The Hospital Epidemiology Service (HES) monitors the occurrence of nosocomial (hospital-acquired) infections, investigates clusters or outbreaks of such infections, and devises policies and procedures to prevent them. The service also educates staff and patients regarding prevention of nosocomial infections and conducts research into the epidemiology, pathogenesis, and prevention of infections. During FY '88, HES staff members kept busy responding to patient and staff concerns about the possible transmission of human immunodeficiency virus (HIV), the cause of Acquired Immunodeficiency Syndrome (AIDS).

The HES continues to focus on HIV, disseminating current epidemiologic information (data on incidence and distribution), and emphasizing the similarities of the epidemiology of HIV to that of hepatitis B. In order to minimize the potential for the transmission of HIV and hepatitis B, HES continues to revise isolation precautions specifically designed to eliminate exposure of health care workers to blood or body fluids of infected patients.

Also during FY '88, in accordance with guidelines established by the Occupational Safety and Health Administration (OSHA), the HES staff developed and coordinated the implementation of the isolation category "Universal Precautions." The staff revised Clinical Center isolation guidelines to include Universal Precautions in order to minimize the potential for the nosocomial transmission of HIV, hepatitis B, and other blood-borne pathogens. Universal Precautions means that all patients' blood and body fluids are to be considered potentially infectious.

Universal Precautions are practiced with all patients. If exposure to a patient's blood or body fluids is likely, hospital staff uses some type of protective barrier equipment when performing such tasks as drawing blood and providing wound care. The barriers used depend on the procedure involved. Gloves are the most frequently used barrier. Other barriers include masks, gowns and protective eyewear. The HES enabled implementation of Universal Precautions by: 1) developing a functional policy for the Clinical Center within the OSHA guidelines; 2) developing and conducting mandated training sessions for all Clinical Center staff; 3) assisting many Clinical Center departments in revising policies to incorporate Universal Precautions; and 4) promoting equipment and barrier availability for Clinical Center staff.

The HES staff conducts numerous other educational sessions, both formally and informally, for virtually every department. All employees are made aware of the presence of HIV-infected patients in the Clinical Center, given up-to-date information about the virus and its epidemiology as it becomes available, and afforded the opportunity to voice their concerns and questions.

The HES staff conducts numerous educational programs for professionals and non-professionals in the community to minimize confusion about HIV. Many medical, nursing, and technical associations, as well as lay organizations, request HES to provide information, answer questions, and allay fear of this disease.

To evaluate the precise risk associated with exposure of employees to HIV-infected patients, the HES is conducting a prospective study in which antibody levels to the organism are measured in annual or more frequent blood samples. The risk has been found to be so small that it is difficult to measure.

The hepatitis B immunization program continues in collaboration with the Department of Transfusion Medicine and Occupational Medical Service.

Surgical Services

Surgical activities were consolidated into the main operating suite pending completion of a new addition consisting of two cardiac and one neurosurgical operating rooms and a cardiac catheterization facility. Operative procedures increased slightly within reduced space, and staffing levels remained adequate with the exception of cardiac surgical nurses, who continue to be in short supply throughout the region. Occupancy of the new facilities is scheduled for the fall of 1989.

The circulating nurse is an important member of the surgical team, assuring continuity of care and facilitating communication among patients and staff. Pre-surgery visits to patient care units permit medical record review and discussions with the patient and his or her other primary care nurses. A patient care plan is prepared and implemented during the surgical intervention. Typically, the circulating nurse maintains a proper sponge count, monitors blood loss, maintains an intake and output record, documents nursing care given, provides necessary instruments and equipment, and handles the disposition of surgical specimens. There are 22 registered nurses in the Surgical Services Department and each is capable of assuming the role of circulating nurse.

Anesthesia

The Anesthesia Section, a division of Georgetown University's Department of Anesthesia, is responsible for the anesthesia support and clinical care of patients at the Clinical Center. In addition, the section provides medical consultations in pain therapy, critical care, and resuscitation. Other activities include professional support to Institute investigational programs; participation in teaching postgraduate physicians, residents, medical students, and other health care professionals in the principles and clinical practice of anesthesia and advanced cardiac life support; and initiation of primary clinical investigations.

During the past 12 months, anesthesia and support services were provided in 2,044 instances, 136 of which were emergencies and 142 were open heart procedures. The recovery room cared for 1,377 patients, including 337 outpatients.

An ongoing advanced cardiac life support course, sanctioned by a local chapter of the American Heart Association and accredited for 16 CME hours, has been offered by the Anesthesia Section since March 1980. The section has two physicians and five nurse faculty members. During FY '88, three provider courses were presented and 27 providers certified. In addition, courses in basic cardiac life support were conducted in conjunction with Occupational Medical Service.

Two residents rotate through the Anesthesia Section at a time. One resident receives training in cardiovascular anesthesia and the other receives training in anesthesia for general surgery cases. Cardiovascular anatomy, physiology, and pharmacology are presented in a lecture format with daily application in the operating room. Operating room experience includes anesthetic management of patients for coronary artery bypass grafting procedures, valvular repairs and replacements, left ventricular myotomy and myectomy procedures, as well as pacemaker implantations, percutaneous transluminal coronary angioplasties, valvuloplasties, and pediatric cardiac catheterizations. The resident in cardiovascular anesthesia participates in ongoing clinical research projects and is required to attend weekly cardiac surgery conferences.

For the general anesthesia resident in general surgery, principles of anesthetic management for various general surgery cases are presented. The resident is responsible for preoperative, intraoperative, and postoperative anesthetic management. At the end of each working day, the resident's cases are reviewed and discussed with the section chief.

Both residents attend educational inservice training sessions including safety and risk management; ethical aspects in anesthesia management; fire, radiation, and electrical safety; and infection control in the operating room. A monthly journal club for faculty and residents covers a topic of clinical interest or ongoing research.

Four medical students participated in the anesthesia fourth year clerkship. During the four-week elective period, the students received didactic teaching and hands-on experience in the operating room. A comprehensive schedule of topics on anesthesia were presented to students by faculty. The students work with faculty members and are given various preoperative, intraoperative, and postoperative assignments during the course of case management. A paper on an area of interest in anesthesia is required from each student at the completion of the rotation. An oral examination also is given.

Intraoperative research include: halothane hepatotoxicity, the response of patients with idiopathic hypertrophic subaortic stenosis (IHSS) to various anesthetic techniques; effects of anesthesia and surgery on intraoperative hormone levels; effects of cardiopulmonary bypass and anesthesia on oxygen and carbon dioxide metabolism; effects of oxygen insufflation during one-lung anesthesia; effects of stellate ganglion blockade on the cardiac electrophysiology of patients with IHSS; and postoperative pain management. All research projects are reviewed and approved by an Institute clinical research subpanel. In addition, several intradepartmental reviews of unique patient populations are ongoing. Data collection on the anesthetic management of patients with hereditary angioedema, chronic granulomatous disease, and Wegener granulomatosis is in progress.

Critical Care Medicine

The Critical Care Medicine Department (CCMD) directs the medical intensive care unit, provides consultative services for seriously ill patients, supervises respiratory therapy and hemodynamic monitoring for all patients, provides an educational program in critical care medicine for technical staff and fellows training in critical care, and conducts research on basic and clinical problems relevant to seriously ill patients.

Clinical Center patients often have serious, life-threatening problems that require the special skills of critical care physicians and specially trained nurses and technical personnel. During FY '88 CCMD admitted 304 seriously ill patients for 3,976 days of intensive

care. An additional 371 patients were admitted for short-term stays in order to perform such clinically-indicated and protocol-required invasive procedures as bronchoscopy, heart biopsy, right heart catheterization to evaluate volume status, or central line placements for intravenous infusions. The majority of the CCMD patients were admitted from the National Cancer Institute (45 percent) and the National Institute of Allergy and Infectious Diseases (37 percent).

Patient care activity, the primary responsibility and focus of CCMD, has become increasingly busy during the last five years. The number of patient admissions has increased by 35 percent since FY '87. Respiratory therapy and hemodynamic monitoring provided 24-hour service seven days a week, which has tripled the number of patients treated since FY '87. Several Institutes admitted more patients with more severe illnesses during FY '88 compared to earlier years. If a successful outcome is to be attained, many therapeutic regimens in the National Cancer Institute, National Institute of Allergy and Infectious Diseases, National Heart, Lung, and Blood Institute, and other Institutes require the ability to support patients through critical illnesses commonly induced by chemotherapy, radiation, or surgery.

Critical care medicine has been recognized as an official subspecialty by multiple disciplines including internal medicine, surgery, anesthesiology, and pediatrics. CCMD has trained four fellows each year since 1982 and fellowship graduates have been recruited by outside institutions. Graduates are pursuing leadership positions or additional training elsewhere.

The department's research, much of which has been collaborative with the Institutes, focuses on septic shock, adult respiratory distress syndrome, the effects of endotoxin, AIDS, respiratory mucous production, and cardiomyopathy. The sophisticated facilities of the department make possible important studies never before performed on patients or healthy volunteers.

The department simultaneously provides clinical service, research, education, and leadership in the field.

Rehabiliation Medicine

The Department of Rehabilitation Medicine provides treatment to all hospital patients in need of physical and occupational therapy, speech and language evaluation, and physical medicine. The goal of these services is to assist patients in reaching their greatest functional potential.

The department made significant progress in several areas during FY '88. The medical section developed a program for the evaluation and treatment of rehabilitation needs of adults with HIV infection. This program includes the assessment of functional deficits as a result of neurological and musculoskeletal impairments. The use of adaptive equipment and coping strategies to improve quality of life and satisfaction in daily activity are stressed.

In support of the protocol studying pharmacological agents in the treatment of children with HIV, the occupational therapy and physical therapy sections compiled a battery of assessments to measure age-appropriate function, including play. These evaluations will be used to help determine the efficacy of newer drugs in influencing motor skills and coordinated and reciprocal movements.

Using a video-based (VICON) motion analysis system, physical therapy staff members performed gait analyses on a below-knee amputee using a variety of prosthetic feet. The study is designed to assess influence of different prosthetic feet on temporal, linear, and kinematic symmetry of below-knee amputee gait patterns.

The highlight of FY '88 for the biomechanics laboratory was the utilization of the facility's capabilities by varied groups, designed to provide clinicians and researchers at NIH with valuable quantitative information concerning human motion and the functional mechanisms that produce human motion. With its emphasis not limited to the study of human gait, the laboratory soon became a valued resource for researchers and clinicians concerned with less frequently studied areas of human motion: speech, upper extremity prosthetics, and neurological impairments. While the study of human gait will continue to dominate the topics of investigation in the biomechanics laboratory, the diversity of research topics will continue.

The speech-language pathology section, in concert with its continuing goal of understanding oral physiology during speech and swallowing, developed several new non-invasive and dynamic instrumental techniques. The application of ultrasound imaging to study normal and abnormal infant suckling and swallowing is a new and exciting development. Any high-risk infant can be studied during normal feeding and the effects of treatment can be studied simultaneously. The department's continuing work in the application of ultrasound imaging focuses on validation of ultrasound measures of the tongue with electropalatography and on correlating two-dimensional ultrasound tongue images with individually tracked points on the tongue and in the oral cavity using an X-ray microbeam.

Clinical Pathology

The Clinical Pathology Department is divided into five services: chemistry; hematology; immunology; microbiology; and phlebotomy. The department performed 3.4 million laboratory tests in FY '88, an increase of 200,000 tests since FY '87.

The clinical chemistry service continues to enlarge the menu of tests and the quality of services. In FY '88, the department expanded the number of tests offered through outside contractors and purchased two multitest analyzers for performing high volume routine blood chemistries. The in-house development of hardware and software enables the laboratory robotic system to perform urinary steroid measurements faster. The department also began measuring serum 5-fluorocytosine with a method developed in-house, for which a patent is being sought. An active research and development effort continues. The department conducted a number of studies examining methodological interferences. In addition, several new methods

were developed including measurement of the magnesium content and concentration in granulocytes, an assay of urinary N-acetyl-ß-D-glucosaminidase (for monitoring damage to renal tubular epithelium), quantitation and phenotyping of various apolipoproteins, and assay of cerebrospinal fluid (CSF) protein.

A study demonstrating the influence of serum-free fatty acids on 16 assays for serum-free thyroxin was completed. Enhanced antimicrobial activity was demonstrated for a series of magainin analogs synthesized at NIH (patent pending). The association between various apolipoprotein concentrations or phenotypes and cardiovascular disease was studied, and several markers for progression of HIV infection were evaluated. A combined serum and CSF immunochemical analysis was applied to the diagnosis of multiple sclerosis, tropical spastic paraparesis, AIDS, and cancer.

The hematology service identified a heparan sulfate anticoagulant in the blood of several NIH patients. This anticoagulant caused significant morbidity. A monoclonal antibody that defines the platelet collagen receptor was identified. Platelet von Willebrand factor was purified and partially analyzed. Five monoclonal antibodies have been produced that identify epitopes to von Willebrand factor present on platelets but not in plasma. Studies reveal that platelets or phospholipids enhance the activation of Factor VIII. Factor IXa can effectively protect Factor VIII from degradation by activated protein C. A variety of cytokines were shown to modulate endothelial cell function; in particular, the expression of von Willebrand factor on the cell matrix was altered. This may play a role in the genesis of thrombosis.

The immunology service provides laboratory support for routine evaluation and research-based investigation of the immune system. The most recent example was the development of a test for determining antineutrophil cytoplasm antibodies. This process results from identification of a specific test need in a patient group or groups by Institute physicians, consultation with Clinical Pathology, and development of the test by the immunology service.

Flow cytometry continues to be of great interest in collaborative research projects. A number of patients and volunteers have been evaluated using extensive two-color monoclonal antibody panels; the department's new laser-based flow cytometer will further enhance this program. The service provides education in diagnostic laboratory immunology to clinicians and other laboratory workers.

The microbiology service developed rapid procedures for identification of pathogens. The monoclonal antibody developed at NIH for detection of pneumocystis pneumonia recently has been marketed, and studies are underway to assure that the commercial product is comparable to the original material.

Rapid detection of varicella zoster virus using a commercial direct fluorescent antibody procedure has been made routine and shortens the diagnostic time considerably. Ongoing studies on rapid detection of mycobacteria from all sources continue to shorten the time for detection, identification, and susceptibility testing. Additional studies, using a novel laser light-scattering detection instrument, are being performed to rapidly determine bacterial killing by antimicrobics.

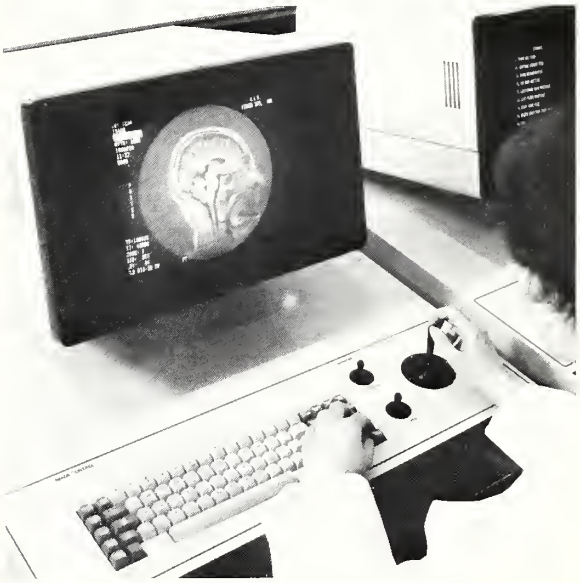
The department initiated studies on more efficient detection of bacteria in blood cultures, and more routine and specific identification of yeasts. The intensive consultation activity with infectious disease groups continues.

The largest boon to the phlebotomy service is a 12-bed outpatient area in the clinic. The outpatient phlebotomy staff has been bolstered to decrease the patients' waiting periods.

The journeyman level of phlebotomist was upgraded in FY '88 from GS-05 to GS-06. Weekend and holiday phlebotomy services were instituted to cover early morning blood drawing for all inpatient nursing units. Major recruitment efforts included newspaper advertisements. The phlebotomy services' short-term goals include having a full complement of highly skilled technicians for outpatient and inpatient phlebotomy and central accessioning areas, and to improve the education available for phlebotomists.

Diagnostic Radiology

Dramatic increases in the demands for cross-sectional imaging studies (CT scans, magnetic resonance scans, and ultrasound examinations) occurred in FY '88, stressing the capacity of Diagnostic Radiology to meet the challenge. Recent advances in the therapy of cancer, such as IL2/LAK cell adoptive immunotherapy and new therapeutic modalities for prostate cancer, have fueled this increase because staging these tumors and evaluating response to treatment are best accomplished with cross-sectional imaging techniques. CT scanning is performed six days a week from 7 a.m. to 7 p.m. A new CT scanner of advanced design is being installed and will permit scans in fractions of a second, greatly facilitating the department's ability to obtain diagnostic studies on very sick patients and infants. The pediatric application is particularly appropriate as NIH prepares to undertake a major initiative in infants with AIDS.



New applications in magnetic resonance imaging have increased demands for this study. During the past year, the department demonstrated that magnetic resonance imaging is much more sensitive in the detection of metastatic tumor in bone than isotope studies, the conventional screening test. A new therapeutic initiative in prostatic cancer, a common tumor among elderly males with a propensity to involve bone, greatly increased the demands for magnetic resonance studies. One of the department's 0.5 Tesla scanners is being upgraded to accommodate this increased demand, and plans are underway for expanding the In Vivo NMR Research Center with an addition to house a 1.5 Tesla scanner.

The development of probes that can be introduced into the body and emit sound waves for diagnostic study has broadened the activities of the ultrasound section. Probes introduced into the rectum have become the most sensitive technique for detecting early tumors of the prostate; transvaginal probes are being used widely in obstetrics, as well as in diseases of the ovary and uterus. Ultrasound physicians currently make daily trips to the operating room to identify liver metastases or tumors deep within the brain or spinal cord. Developments in this area have provided an extension of the surgeon's fingers into such organs as the liver and pancreas, where it was previously difficult to detect deep-seated lesions.

In summary, the development of the new imaging techniques and new applications continues to stress the department's capacity to provide services, and provides an exciting and stimulating environment in which the department is rising to the challenge.

Transfusion Medicine

The Department of Transfusion Medicine (DTM) combines the traditional role of a hospital blood bank, services usually found in regional blood collection centers, and the clinical and developmental research tradition of the Clinical Center.

National concern about transfusion-transmitted AIDS has placed increasing emphasis on assuring the safety of blood transfusion. DTM performs a variety of screening tests for hepatitis and for HIV, the AIDS virus, on donated blood and blood components for research, as well as all such testing for Clinical Center patients. Testing increased 11 percent in FY '88 and more than 50 percent for diagnostic HIV testing. This increase reflects the growth of clinical research in AIDS being carried out in the hospital.

Research studies from DTM resulted in improved screening of blood for hepatitis and a projected national decrease in post-transfusion hepatitis. During FY '88, preliminary studies of a specific screening test for non-A, non-B hepatitis promised to reduce further this major infectious complication of blood transfusion. In the area of AIDS research, the department continued its five-year longitudinal study of blood donors who carry the AIDS virus and of infected recipients of blood. Results of these studies have been instrumental in modifying screening procedures and management of individuals exposed to this virus. DTM investigators participated in the DHHS executive task force on AIDS that convened in Charlottesville, Va., in June 1988.

During FY '88, there was a growing concern about another retrovirus HTLV-1, which has been associated with a rare form of leukemia and unusual neurologic disorders. DTM investigators working with stored blood specimens were the first to define the incubation period following transfusion of this virus and to demonstrate some of the technical difficulties in laboratory screening. A test for this virus has been licensed and will be used to screen blood across the United States. DTM investigators were members of the USPHS working group that developed policies for HTLV-1 screening.

Collection and transfusion of standard blood and blood components continues at about the same level as in the previous year, but a variety of different diagnostic and therapeutic procedures demonstrates the scope of services performed in FY '88. More than 1,200 tissue-typed donors have been recruited by the DTM as participants in the national unrelated bone marrow donor program; the first "coast-to-coast" marrow transplant was performed in February 1988. An NIH donor was matched with a patient in Seattle. DTM staff accompanied the donor to Johns Hopkins where marrow was harvested and transported to Seattle. The recipient had rapid marrow reconstitution, an uncomplicated course, and left the hospital within three weeks. Locally, incompatible bone marrow from the mother of a patient at Children's Hospital National Medical Center was brought to NIH, where DTM staff, using automated techniques developed in collaboration with the National Cancer Institute, processed the marrow for a successful transplant. Similar techniques were used to prepare concentrates of monocytes, a white blood cell usually not used for transfusion, to treat a critically ill patient with aplastic anemia. The blood cell labeling laboratory traced red cells, platelets, and a variety of different white cells labeled with radioisotopes in order to assure compatible transfusions, identify suspected sites of infection, and help evaluate experimental cancer therapy in Clinical Center patients.

Blood cell separators are used to collect or remove specific blood components such as plasma, platelets, and leukocytes in a procedure called "apheresis." Nearly all of the platelets transfused at the Clinical Center are collected by plateletpheresis. Leukapheresis was used to collect more than 250 white cell concentrates used to treat patients with defective white cell defenses and repeated severe infections. In addition, automated procedures were devised to collect large amounts of von Willebrand factor, a plasma protein essential for blood coagulation, from the father of an affected child. Depots of this component stored around the country permit the family to travel freely. More than 100 therapeutic

apheresis procedures were carried out on patients with a wide range of disorders from sickle cell disease to familial hypercholesterolemia. More than 1,000 procedures were performed to collect components for NIH researchers.

DTM trained many prominent blood banking professionals. The staff fellowship program enters one physician each year into a two-year program of service and research. A specialist in blood banking (SBB) program was established for medical technologists in 1966 and currently enrolls three students in a one-year program. In FY '88, one student won a competitive scholarship awarded by the American Association of Blood Banks, while another won a travel grant from the American Society of Hematology for research projects completed during the previous year. The department sponsored its seventh annual Symposium on Immunohematology and Blood Transfusion for more than 200 attendees at Lister Hill and a symposium entitled "Transfusion Medicine for Nurses" for 350 attendees from across the country. Educational materials, presentations at national meetings, and publications of original research placed nurses, physicians, and technologists from DTM among the national leaders in transfusion medicine.

Nuclear Medicine

FY '88 was a year of challenge for the Nuclear Medicine Department (NMD). The department continued to provide diagnostic scintigraphy services for Clinical Center patients and supported Institute research through both clinical imaging and research collaboration.

Recruitment and retention programs have been a constant concern for the department, but FY '88 required a new and more vigorous effort to help make Clinical Center allied health professionals' salaries and benefits more competitive. The approval of a request for special pay rates under Title 38 for nuclear medicine technologists resulted in a fully staffed clinical studies section in 1989.

The department provides research and clinical services in Positron Emission Tomography (PET). PET is a collaborative effort among the Institutes, and the DNM radiochemistry and the PET sections. The on-site synthesis of positron-emitting radiopharmaceuticals supported several new PET protocols in FY '88, including ^{18}F fluorodopa for dopamine receptor studies in patients, and PET cardiac imaging

with ^{13}N ammonia, ^{11}C monoxide, and ^{15}O. Research continues on protocols involving Alzheimer disease, tumor growth, and detection of complications following treatment with radiation therapy or chemotherapy.

A full complement of PET tomographs, two brain units, and a whole-body instrument are in place and functioning. The department enjoys a unique network of instruments linked to a central VAX 8600 computer. The computer software (MIRAGE) and hardware configuration was developed on-site and serves as a model for other nuclear medicine facilities. Two other important pieces of technical development implemented by the PET section include the thermoplastic head restraint system, and a rotating pin source device. The rotating pin source allows for more accurate, noise-free measurement of tissue density critical to the processing of patient image information. This single development increases patient input by reducing the time for acquisition of a PET study and helps to reduce the effect of patient motion on image accuracy.

The radiochemistry section is responsible for the continued development of new production methods of positron-emitting radionuclides, as well as the synthesis of these nuclides into radiopharmaceuticals. New radiopharmaceuticals available in FY '88 were ^{18}F dopamine (2- and 6-fluoro) used in peripheral autonomic nervous system imaging; ^{11}C monoxide used for blood volume determination; ^{13}N ammonia used for myocardial perfusion imaging; and ^{18}F methoxydopa used in determination of dopamine turnover. Automation of specific synthesis techniques continues for FDG (mannose-free), ^{18}F cyclofoxy, and ^{18}F fluorodopa. The DNM radiochemists also have been collaborators in the development of several radioligands finding research application outside the NMD. The cyclotron facility engineers are actively developing new targetry for the two NIH medical cyclotrons. Tandem targetry for the CS-30 cyclotron will allow for its use interchangeably with the JSW cyclotron. In addition, technical development of "powder" cup targetry to expand radionuclide production capability is ongoing.

Research continues in the diagnostic and therapeutic applications of murine and human monoclonal antibodies (MoABs). Radiolabeled MoAbs are used to detect malignant disease and determine the extent of metastases by scintigraphy with a gamma camera. The focus continues to be on the clinical diagnostic and therapeutic use of MoAbs for the detection and treatment of intraperitoneal metastases from colorectal and ovarian adenocarcinomas with ^{131}I radiolabeled monoclonal antibody and treatment of chronic leukemias and cutaneous T-cell lymphomas with a Yttrium-90-radiolabeled mono-

clonal antibody. Several other collaborative efforts are ongoing with National Cancer Institute investigators, including the study of kinetic patterns of radiolabeled autologous monocytes in normal volunteers, and lymphocytes in cancer patients.

Nursing

FY '88 was a period of continued growth, accomplishment, and change for the Nursing Department. Despite a national shortage of nurses, vacancy rates and turnover at the Clinical Center were dramatically reduced. The department was successful in filling long-standing openings in all areas and opened new programs to support research in the areas of AIDS and cancer treatment. Clinical services were consolidated under four service chiefs, and a division of nursing information systems and quality assurance was created. A patient classification system and unit-based quality assurance program have facilitated measuring and documenting the quality and quantity of patient care. The continuing development of the clinical ladder and new roles for nurses in support of biomedical research have enhanced primary nursing and recognized clinical expertise among staff.

Participation of all levels of nursing staff in decisions affecting practice and the work environment is an integral part of the philosophy of the Nursing Department. Nurses have opportunities for committee work and meetings with nursing administration; their ideas are requested and acted upon. Staff has the opportunity to participate in professional and community activities, and to receive

assistance in preparing presentations and representing the Clinical Center at professional conferences. Clinical excellence and achievement have been recognized in a variety of ways this year. The department's annual meeting, at which more than 200 staff received recognition and two nurses were inducted into the American Academy of Nursing, are just some of the examples of the department's progress.

Nurses at the Clinical Center were among the first to care for AIDS patients and to develop nursing care and treatment approaches to the multifaceted problems associated with HIV infection. Department staff continue to be called upon to share their expertise in this critical area, from involvement with the President's Commission on AIDS to educational presentations for community and professional groups. A multidisciplinary, cross-service approach is taken in caring for patients with HIV infection, and to supporting and educating nurses choosing to specialize in this challenging area.

The Nursing Department is committed to the support of clinical practice through skilled unit-level management, the availability of expert nurse clinicians and of clinically-oriented nurse educators in all areas. Head nurses are accountable for the 24-hour management of a clinical research unit, including clinical practice, implementation of research protocols, staffing and scheduling, selection, hiring, supervision, and evaluation of all unit staff, as well as managing a unit budget. Clinical nurse specialists are responsible, as colleagues of the head nurses, for support of the quality of clinical care for a given specialty. They serve as expert consultants to primary nurses, develop and monitor standards of practice, provide specialty expertise in the development and implementation of staff education programs, and develop nursing research studies to improve clinical practice. Clinical nurse educators are responsible for the development of educational curricula and other materials with a general or specialty focus. Programs include orientation, preceptorship, and patient education, as well as specialty courses, training programs, and conferences that may be open to the professional community.

In FY '88, with staffing shortages essentially resolved, the Nursing Department has been able to fully capitalize on the unique opportunities for clinical practice and innovation that are available at the Clinical Center. It has been a year of team building, consensus sharing, and continued commitment to the goals of clinical excellence and outstanding research results that are the mission of the Clinical Center.

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